

ENGINEERING PRACTICES STUDY

PROJECT NUMBER: 60GP-2008-002

TITLE:

Review of non-government standard (NGS) TIA-455-175 (revision B) to determine significant changes and develop recommendations for reference to TIA-455-175 in Government standardization documents.

24 January 2008

FINAL REPORT

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I. **OBJECTIVE:** The objective of this study was to develop specific reference(s) to the appropriate test methods contained in the new NGS (TIA-455-175 revision B) for inclusion in fiber optic government standardization documents. Information contained in this EPS will provide guidance in referencing TIA-455-175 in fiber optic government standardization documents.

II. **BACKGROUND:** TIA/EIA-455-175A, "Chromatic Dispersion Measurement of Single-Mode Optical Fibers by the Differential Phase Shift Method" dated 27 October 1992 has been superseded by TIA-455-175B "Measurement Methods and Test Procedures – Chromatic Dispersion (IEC-60793-1-2 Optical Fibers Part 1-42)" dated 21 May 2003. With this supersession, additional methods were added. Present references to TIA/EIA-455-175 do not provide adequate direction (method not specified). The primary document that cites this NGS is MIL-PRF-49291.

III. **RESULTS:** A detailed review of both TIA/EIA-455-175A and TIA-455-175B was performed to determine significant changes. The following significant changes were identified:

- Addition of testing for multi-mode (MM) fiber
- New test procedures were added to include a total of four (4) specific test methods, each with its own application, setup and procedure.

IV. **CONCLUSIONS:** Based on a review of TIA-455-175 (revision B), the following table summarizing the test methods was developed:

Method	Title	Fiber	Light source(s)	Sample length	Comments
A	phase shift	all type B (SM) & A1 (graded index MM)	laser diodes or filtered LEDs	1 km min	Ambiguities of 360 degrees phase shift can occur
B	spectral group delay in the time domain	all type B (SM) & A1 (graded index MM)	Nd:YAG/fiber Raman laser source	1 km min	Requires special light source
C	differential phase shift	all type B (SM) & A1 (graded index MM)	modulated light source	1 km min	Similar to rev A, added MM graded index fiber
D	interferometry	type B1 to B3 (SM) fibers	Mach-Zehnder interferometer	1 - 10 m	Applies only to SM fiber & extrapolation of data to longer lengths is not reliable

V. **RECOMMENDATIONS:** Revise any references to EIA/TIA-455-175 for Chromatic Dispersion in government documents to TIA-455-175 method C. Revise MIL-PRF-49291 to reference TIA-455-175 method C.